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PLANT-GROUPS AND THEIR CONSTITUENTS AND PROPERTIES.[1]

By John M. Maisch.

On several occasions, when fulfilling the assigned duty of addressing the students of this College, introductory to the annual courses of lectures, I have discussed questions relating to the origin and the supply of drugs, or referring to physiological processes of plant-life. The study of Materia Medica affords a never-failing source of inquiries into matters of the utmost interest to mankind, which are not confined merely to the identity and quality of a drug, but which involve also commercial and economical questions, and frequently are influenced by, and more or less closely related to, historical events. We are thus led upon a field which is entirely distinct from the pharmaceutical uses and medical application of drugs, and which enlists the interest of the student of general and special history equally well, and sometimes even to a much greater degree, than it does the student of medicine and pharmacy. I need but refer to the discoveries that have resulted from the efforts to find direct communication by sea with the countries where the most valued spices are indigenous; to the changes in the habits of civilized nations occasioned by the introduction and extension of the use of the potato and of coffee and tea; to the influence exerted by Arabian physicians upon the medical armamentarium of Europe; to the events which favored the general use of tobacco in Europe; to

[1] Introductory Lecture to the seventieth course of instruction in the Philadelphia College of Pharmacy, October 1, 1890; published at the request of the Publication Committee.

the causes of scarcity in the supply of senna and gum arabic; to the political complications which were engendered by the cultivation of opium; to the introduction into medical use of cinchona bark; to the changes in commerce and manufacture, as well as in pharmacy and medicine, which are the direct outcome of the cultivation of the cinchonas in the Eastern hemisphere.

The investigations in Materia Medica have supplied the infant Chemistry with a multitude of valuable facts, and helped to nourish that science, until it is now able to repay the debt by furnishing, from its own retorts, many compounds which may take, and to some extent do take, the place of medicines that heretofore were procured only from Nature's bountiful laboratory.

Medicine, that is, Materia Medica, was to a large extent the incentive that led to the study of Botany; and that science, in turn, again leads to the study of the possible uses of plants, or to economic and medical botany. That, apparently, a certain relation exists between the genetic forms or groups of plants and their properties, useful as well as deleterious, was pointed out more than a century ago, after Linné had laid the foundation for the scientific classification of plants. Though subsequently repeatedly denied, such a relation has, in more recent times, been unquestionably established and will doubtless become still more apparent, as continued researches make us more intimately acquainted with the internal structure of a larger number of plants, and with the influence which the various kinds of tissue exert upon the elaboration of the crude material taken up from the soil or imbibed from the atmosphere. The connection alluded to is entirely different from that which in all countries the popular mind has attributed as existing between the external shape of a plant or a plant-part and its curative effects. The traditions of such apparent exemplification of the inherent property by visible and striking characters are still cherished in many localities among different people, and find expression in popular names as well as in medical and botanical terms. The peculiar shape of the three-lobed leaves of a ranunculaceous plant, and of the lobed green and brown thallus of certain acotyledons, in which a resemblance to the liver was fancied, induced the belief into their value for the cure of liver complaints; hence the appellations *hepatica*, and *liverwort*, and equivalent designations in other languages. The Latin *cardiaca* and synonymous terms in French

and German refer to the shape of the leaves and the hold which they were supposed to have upon the heart by means of their divisions. The generic name *Panax* is intended to indicate the value as a panacea attributed to the root from its supposed resemblance to the figure of a man; the same cause for which miraculous virtues were ascribed to the European mandragora root, though neither the Latin name of the latter nor its vernacular synonyms remind us of the high esteem in which it was formerly held as a remedy.

The relation between genetic form and properties, to which I have referred, rests upon more substantial ground than the illogical conclusions deduced from mere physical appearance. It is based upon the axiom that a like cause must produce a like effect; the cause —though at present it can only be conjectured without having adequate proof—will doubtless ultimately be ascertained to operate in the interior fabric of the plant. While in such plants, frequently, the external organs show undoubted evidence of close relationship, these latter do not constitute the moving cause, but are of secondary significance, though they may sometimes embrace all the members identical or at least closely analogous in their internal structure. For these reasons, the groups of plants agreeing, substantially, in their constituents, and hence in their effects, must vary in extent, and cannot be absolutely identical with those groups which by systematic botany have been established under the designation of tribes, families or orders. Several of these latter may sometimes agree in the presence of one important constituent; but more frequently it will be found that one order, particularly if embracing numerous genera and species, may be regarded as forming two or more groups, the members of each having a close family resemblance in the products furnished by them, and, as far as known, in their anatomy.

Starch is a compound generated in nearly all chlorophyll-forming plants, and the storage material, common to by far the largest number of seed-bearing plants, especially to the subterraneous organs of the biennial or perennial herbs. Yet it is almost entirely absent from the extensive order of Compositæ—which alone embraces over 10,000 known species—being replaced by the analogous carbohydrate inulin, and this is also a constituent of Campanulaceæ Lobeliaceæ and one or two botanically allied orders.

Another common storage material is fixed oil, secreted chiefly in the fruit and seed. While rarely, if ever, absent, yet it is very generally known to vary very considerably in amount and in kind; that there are grades of solid and liquid, and of drying and non-drying fats; that, while some seeds are quite oily, yielding the fat readily on even slight pressure, from others the same constituent will have to be extracted by solvents in order to prove its presence. In the case of lycopodium, the presence of a large amount of oil was noticed only after the cell-walls of the spores were torn by trituration with sand or glass.

Let us briefly consider a few groups of plants and their relation to others with regard to constituents produced by them, and hence with regard to their medicinal value.

Among the Acotyledons we meet with the extensive class of Fungi yielding the drug Ergota, the only one of this class generally recognized by pharmacopœial authorities, though somewhat allied fungi—like the cornsmut—possess to some extent analogous properties. While many of the class are edible, like the different mushrooms, morel and truffle, perhaps the largest number is decidedly poisonous, probably in consequence of the presence of one or more alkaloids. These compounds are known only to a limited extent, including those present in ergot, and the muscarine of fly-agaric. It is not improbable that they are chemically related to the ptomaines. A definite compound of apparently valuable medicinal properties, agaricin, has recently attracted attention. It is not positively known whether it exists in other plants than the white agaric, which is also characterized by resinous compounds, met with only to a limited extent in this class of plants.

Of greater economic value are the algæ, more especially those growing in seawater. Though many are locally used as food, their real nutritive value appears to be insignificant. The so-called Irish moss has retained its pharmacopœial position to the present day. Algæ, possessing anthelmintic properties, are used along the Mediterranean, and the bladder-wrack, some years ago, acquired much notoriety as a remedy in obesity. Since iodine is present in the ash of marine algæ, this constituted at one time the only or chief available source for the manufacture of this element. The most important organic constituent is a gelatinizing carbohydrate, which they either contain or else readily form on boiling, and upon which

their supposed nutritive properties depend. Mucilaginous compounds, analogous in composition, are widely distributed among plants; few, if any, being entirely free from such. But occasionally mucilage is met with in abundance as one of the characteristics of phaneragamous plant-groups; for instance, in Malvaceæ, particularly in the mallow tribe proper; in the tuber-bearing orchids, and in the bulb-bearing liliaceæ. We meet with it in the epithelial layer of the seeds of flax, quince, certain salvias, plantagos and of many other plants; we find it in leaves, like benne, senna and buchu; and we observe it as an exudation, most likely caused by internal metamorphosis, upon shrubs and trees of the genus Astragalus, the Mimoseæ, Pruneæ and other groups of the dicotyledons.

Closely allied to these mucilaginous bodies, which are known to be carbohydrates, are others in the composition of which, apparently, less hydrogen is contained, though this still awaits final settlement by renewed researches with the means at present afforded by science. I refer to what are known as *pectin*-compounds and which are met with in sweet and acidulous fruits generally, such as the lemon and orange, the currant and gooseberry, the pear and other pomeæ, the peach and allied pruneæ, the raspberry and blackberry, the pumpkin and melon, the cranberry and huckleberry, and many others. But these pectin bodies have also been found in other parts of plants, and notably in certain biennial and perennial fleshy roots, usually associated with sugar, and, like the latter, constituting most likely a reserve compound in the carrot and parsnip, the turnip, peony, and in the officinal yellow dock, senega and gentian. These amorphous compounds present many difficulties in their purification and liberation from coloring and other principles; yet it is now generally conceded that the metapectic acid of the beet and other plants is in reality identical with arabic acid of gum acacia.

While the algæ grow submersed, the lichens are air plants, usually fastened upon rocks, walls or the bark of woody plants. Some are of industrial value as the source of litmus or cudbear; others are used as food, principally in the arctic regions, and a species of Lecanora has, by some scientists, been regarded as the manna of the Hebrews. The species which have been employed medicinally were regarded as being valuable in pectoral complaints, and of these the so-called Iceland moss still holds its place in the Pharmacopœia.

Its bitter principle, cetraric acid, has been recently employed medicinally; to what extent it is related to the bitter principles of other lichens is not known.

Coloring matters—others than chlorophyll—are formed by all plants with but few exceptions, and are not confined to plants of low organization. Aside from those principles imparting color to flowers and fruit, the chemistry of which is still involved in obscurity, many of the industrially important chromogenes and coloring matters have been investigated to a larger or more limited extent, like indigo and alizarin, and the color-compounds present in or obtainable from logwood, quercitron bark, red saunders, saffron and others; but little or no chemical relation exists between these bodies, and with the exception of indigo and quercitrin they are mostly met with only in one plant, or in a few which are botanically related. However, the yellow crystals of chrysophanic acid yielded by a Parmelia are identical with the same compound prepared from rhubarb or yellow dock of the Polygonaceæ, or from senna and from araroba of the Leguminosæ. To what extent this principle, or such yielding it, may be distributed throughout the vegetable kingdom, must be left to future researches.

The few species of the liver mosses, mosses and equisetums, which were formerly medicinally employed, have long since been discarded from regular practice, and but very little is known of their chemical constituents. Of more than passing interest is the presence, in the species of equisetum, of large amounts of silica, doubtless serving for the purpose of protection. Though the same mineral compound is present in small percentage in the ash of most plants, the equisetums share only with the grasses, sedges and a group of the palms the very general distribution of silica and its relatively large proportion.

In regard to the medicinal properties of the ferns, we meet with a notable distinction between the effects of the foliaceous fronds and those of the rhizomes. In the former, we find mucilaginous principles predominating, and associated with mildly astringent and slightly aromatic qualities; these fern-leaves have, therefore, been used as remedies in pectoral complaints, for which purpose the European and North American species of Adiantum, known as Maidenhair, are still employed. However, the only ferns officinal, according to our and most other Pharmacopœias, are known by our

authority as Aspidium; the rhizome, which is the part used, has the same constituents which are met with in other ferns, varying in proportion in the different species. Fern rhizomes are generally reputed to possess anthelmintic and tænifuge properties, due to the presence of filicic acid or similar compound. Only a small number of ferns are indigenous to the northern hemisphere; the home of most of the nearly 3,000 species of ferns is in damp localities of the tropics, where quite a number assume a tree-like aspect, attain a height, sometimes, of fifty or sixty feet, and in habit resemble a stately palm. A handsome Cyathea and others have a farinaceous tissue which is used as food and establishes a resemblance with the sago palms, independently of the general habit. The astringency, which is observed in some degree in the male fern, becomes so strong in some species that they may be used for tanning. In fact, among the cryptogamous plants, only those having vascular tissue contain tannin, and the ferns are the only group in which notable quantities of it are met with. This compound—or rather class of compounds—is more generally diffused among phanerogamous plants, where different kinds appear to be most largely found in the leaves, in the bark of trees, in rhizomes, in some perennial roots, and in such morbid excrescences like galls.

The gymnospermous plants, to which class the pines belong, though numerous as regards individuals, comprise only about 450 species, two-thirds of which are coniferous. The latter are characterized by the production of volatile oils, many of them being hydrocarbons, and by the secretion of resins. Both these classes of compounds, as we have seen, occur only to a very limited extent in the cryptogamæ. But volatile oils and allied aromatic compounds are met with, to some extent at least, in most phænogamous orders. They are produced in certain groups of the grasses, orchids and lillies of the monocotyledons, and likewise in certain genera or species of the violets, geraniums, leguminosæ, rosaceæ, compositæ and others, while these principles very generally pervade the scitamineæ, laurels, labiatæ, umbelliferæ, the myrtles, oranges and other groups. A peculiar variety of volatile oils, containing sulphur, imparts a unique pungency to the cruciferous and some allied plants; and similar in composition, though different in scent, are the volatile oils of the alliums and of certain umbelliferæ, of which the asafetida plants are representatives.

Resins are likewise widely distributed throughout the phanerogams, and but few of these plants appear to be destitute of such compounds. Very frequently they are associated with volatile oils, or with gum, or with both; in the two last-named cases they usually form milky exudations, from which the officinal gum resins are obtained.

Saponin has received its name from a plant of the caryophyllaceæ, in which order it appears to be of frequent occurrence; but it or an allied compound has also been shown in the polygalaceæ, in the rosaceous quillaia, in the smilaceæ and other plant-groups, while volatile acrid compounds exist in many aroideæ, in buttercups and their immediate relatives. Somewhat allied to the saponins are certain powerful poisons of the liliaceæ, primulaceæ and of digitalis and other scrophulariaceæ.

The aroideous calamus owes its medicinal virtues to a volatile oil and bitter principle, types of compounds which are frequently associated in the bitter-tonic drugs. But others, like the simarubaceæ and gentianaceæ, have developed the bitter principle to the total or almost complete exclusion of aromatic and astringent compounds.

Many of the principles referred to belong to the class of glucosides, so called because upon decomposition under certain influences glucose or an allied carbohydrate makes its appearance as one product. A peculiar group of the same class should be mentioned here, apparently confined to the convolvulaceæ, like jalap and scammony, which owe their cathartic action to so-called resins, in reality, to water-insoluble anhydrides of water-soluble acids, both splitting into compounds, one of which is sugar.

The bitter taste is not solely confined to the glucosides and so-called neutral compounds. A very large number of the most important class of alkaloids share with the former this property. It is now nearly three-quarters of a century that the first alkaloid, morphine, has been announced as a basylous organic compound; to-day the members of this class, both natural and artificial, are almost innumerable. Among the acotyledons it is almost exclusively the class of fungi which in its different groups produces alkaloids, quite distinct, as a rule, in composition and effect, from those generated within the living tissue of phænogams. Such alkaloids are in nearly all cases confined to a single species, or genus, or tribe, and only in rare cases have been met with in several orders. Thus,

berberine exists in plants of the ranunculaceæ, anonaceæ, menispermaceæ, berberidaceæ, rutaceæ and leguminosæ; and caffeine in the orders of rubiaceæ (coffee), ternstroemiaceæ (tea), sapindaceæ (guarana), sterculiaceæ (cola and cacao) and in ilicineæ (maté, etc.). But colchicine has only been observed in colchicum; veratrine and jervine in veratrum; piperine in certain peppers; quinine and allied alkaloids in cinchona and remijia; strychnine and brucine in strychnos; morphine and congeners in opium, and one or two of these compounds also in other poppies; sanguinarine in a few papaveraceæ; pilocarpine, physostigmine and cocaine, each only in a single species; aconitine and its near relatives in several aconites; nicotine in species of tobacco, etc. A most interesting group are the mydriatic alkaloids of the solanaceæ, which are widely distributed throughout this order, are very similar or identical in elementary composition, and may, in part at least, be converted one into the other.

I have dwelled upon a few only of the relations between plants and their constituents and properties, and have merely hinted at some of the structural causes. Enough has been said, I trust, to show the intense interest attached to the questions involved. As we proceed with the work beginning this evening, we shall have frequent occasions to note some facts of the kind spoken of, and it has been my object to enlist, in advance, your earnest attention to their importance—important to the pharmacist and to the physician, and not less so to the student, both junior and senior.

ANTISEPTIC MATERIALS.

By Joseph W. England, Ph.G.

Read at the Pharmaceutical Meeting, before the Philadelphia College of Pharmacy, Oct. 21.

With the advent of antiseptic surgery, there has arisen a demand for certain new products in the form of medicated solutions, gauzes, cottons, etc., necessary for the successful prosecution of that form of treatment.

It is to be regretted that the preparation of these products, owing to their comparatively limited demand in the past, has fallen almost entirely into the hands of special manufacturers, when, by their preparation, a perfectly legitimate source of revenue could be added to the pharmacist's fast diminishing list. Their preparation requires no special machinery nor demands any special skill, save only the

exercise of absolute chemical cleanliness, and it is more than probable that, if physicians were made aware that all such appliances could be had of the pharmacist, made fresh and just as desired, their use would rapidly extend; resulting in a triple benefit to patient, physician and pharmacist.

Certain it is that antisepsis has come to stay. As a rational, scientific method of surgical treatment it has passed the experimental stage and amply proven its worth, and pharmacists, with but little trouble, could now establish a healthy demand for antiseptic materials.

It may not be amiss to here call attention to the composition of the various antiseptic solutions at present used. Corrosive sublimate, in various strength solutions, of from *1* part in *1,000* parts to *1* part in *5,000* parts of water, is most largely employed. Dr. C. M. Wilson's solution is *1* part, each, of mercuric chloride and ammonium chloride (or the old Sal Alembroth) in *1,000* parts of water. It has been shown that gauzes and cottons made with this solution do not reduce the soluble, active, mercuric chloride into the insoluble, germicidally-inactive mercurous chloride or calomel, as is the case when mercuric chloride is used alone. Carbolic acid, especially the "$\frac{1}{20}$" solution, is still used quite largely, but more especially as a disinfectant and not as a germicide. Benzoic and salicylic acids, in the form of solutions, are now but rarely used. Boric acid, however, is developing strong popularity and is extensively employed in bed-sores, ulcers, inflammations, etc., and especially in ophthalmic practice (*10–18* grains to each fluid ounce of water).

Dr. La Place's tartacid sublimate solution is a solution of *1* part of mercuric chloride and *5* parts of tartaric acid in *2,000* parts of water. Dr. La Place was led to advocate the addition of tartaric and, because he found that unless free acid be present, the mercury was precipitated as an insoluble, mercuric albuminate, upon coming in contact with blood serum. He informs the writer that he first suggested tartaric acid because of its convenience, but has since found that hydrochloric acid will answer equally as well, if not better. In his wards he uses the following formula:

Mercuric chloride, *1* troy ounce. Hydrochloric acid, *5* fluid ounces. Water, a sufficient quantity to make *8* fluid ounces. Dissolve. *1* fluid drachm to the pint equals $\frac{1}{1000}$ of mercuric chloride.

A criticism reported on this combination is that the large propor-

tion of hydrochloric acid gives the solutions an irritating or slightly escharotic action, and causes considerable pain. This charge is also made upon the tartaric acid solution, though in the latter case the irritation is said to be much less.

It may be of value to know that the universal use of acids in germicidal solutions is strongly objected to by some physicians. It is claimed that acids are only desirable where false tissues, indolent ulcers and deep-seated abscesses exist, and, though mercuric chloride may form at first an insoluble albuminate upon contact with blood serum, such a precipitate or film does not thereafter affect its germicidal action. It is of interest, in this connection, to note that, according to Mr. Martindale,[1] mercuric albuminate is soluble in an excess of albumen, so that after the dressing has been applied the filmy precipitate is probably dissolved away by exuding blood serum.

Pana's antiseptic solution, used only in ophthalmic practice, is made with $\frac{1}{8}$ gr. of mercuric iodide, *60* m. of alcohol and *5* $\frac{1}{2}$ fl. oz. of water. Dr. Conrad Beren's silico-fluoride tablets are composed, each, of sodium silico-fluoride, *1* gr.; hydrastine hydrochlorate, $\frac{1}{12}$ gr.; sodium bicarbonate, *3* gr.; sodium biborate, *2* gr.; eucalyptol, $\frac{1}{4}$ m. For using, one tablet is dissolved in four fluid ounces of water. Dr. Carl Seiler's alkaline antiseptic tablets are made, each, of sodium bicarbonate, *3* $\frac{3}{4}$ gr.; sodium biborate, *3* $\frac{3}{4}$ gr.; sodium benzoate, $\frac{1}{6}$ gr.; sodium salicylate, $\frac{1}{16}$ gr.; eucalyptol, $\frac{1}{6}$ gr.; thymol, $\frac{1}{6}$ gr.; menthol, $\frac{1}{26}$ gr.; and oil of gaultheria, $\frac{1}{22}$ gtt. To use, one tablet is to be dissolved in two fluid ounces of water.[2]

An antiseptic solution much used in the Philadelphia Hospital, as an addition to gargles, washes and lotions, etc., is the following solution, prescribed under the name of "Liquid Antisepticus:" Menthol, 3 gr.; thymol, 8 gr.; boric acid, 30 gr.; sodium benzoate, 45 gr.; sodium salicylate, 45 gr.; oil of gaultheria, 6 gtt.; oil of eucalyptus, 18 gtt.; glycerin, 4 fl. dr.; alcohol, 2 fl. oz.; water, a sufficient quantity to make 6 fl. oz. Mix. Use largely diluted with water. A marked peculiarity of this antiseptic solution is the fact that, though at first it becomes opalescent on the addition of water

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[1] A. J. P., 1885, p. 520.

[2] The original solution of Dr. Seiler's contained, also, in each two fluid ounces, *32* minims of glycerin and *5* minims of alcohol, but in the tablet these have, of necessity, been dispensed with.

from precipitation of the oils, yet, on the further addition of water, it again becomes transparent.

An antiseptic which of late has attracted much attention is that first introduced by Dr. E. P. Bernardy (1886), of this city. It is a solution of mercuric iodide (*1* part) with sufficient potassium iodide to dissolve. Theoretically, it would require about three-fourths of the quantity of the mercurial salt used, but in practice he uses equal parts, so as to prevent the possibility of subsequent precipitation of mercuric iodide on further dilution with water.

It is claimed that $\frac{1}{4000}$ solution of this compound is equivalent in germicidal strength to a $\frac{1}{2000}$ solution of mercuric chloride, and experiments made by Bernardy, Krassowski and others would seem to justify the claim. Further, Dr. Bernardy informs the writer that in his experiments he found, with a $\frac{1}{4000}$ solution, no precipitation, upon adding it to blood serum, and Mr. Listed states that red mercuric iodide is freely soluble in 200 parts of blood serum and remains most actively antiseptic.

One drawback to its more general employment is its ineligibility. Mercuric iodide and potassium iodide cannot be compressed together in tablet form on account of the deliquescent nature of the combination, and it is not advisable to add, as has been sometimes done to obviate that result, ammonium chloride, for fear of ultimate conversion of the mercuric iodide into mercuric chloride and ammonium iodide. The best way would seem to be to compress separate tablets of *3½* grains, and, on using, dissolve one of each, in a small quantity of water first, and then add the balance of water to make the quart.

In introducing this antiseptic, the chemical error has been made of calling it "biniodide of mercury." It is nothing of the sort. By chemical addition, a very deliquescent and entirely different compound is formed, namely, potassio-mercuric iodide ($2\,KI.\,HgI_2$).

We, as pharmacists, know what a strongly decomposing influence this solution, in the form of "Mayer's Reagent," has upon alkaloidal solutions—even greater than a solution of mercuric chloride, and a possible explanation of the high germicidal value of potassio-mercuric iodide may be found in that fact, with also Dr. Van Arsdale's (Annals of Surgery) explanation of the antiseptic action of iodoform, remembering that ptomaines are, in a strictly chemical sense, alkaloids. He says that "the germicide power of iodoform

was long supposed to be the secret of its value in the treatment of wounds, but recently it has been conclusively proven that as a germicide it is feeble and acts within narrow limits. Further investigation into its mode of action has elicited that it is a chemical antidote to the ptomaines. The ptomaines, the product of the bacteria, are exceedingly devitalizing to the tissues, and their destruction by the iodoform enables the tissues to destroy the germs or resist their malign assaults. In dressing wounds, the surgeon must hereafter use two different sets of antiseptics. He must first seek, as far as possible, to exclude disease germs or to render them inactive, and for this purpose he must use germicides, such as corrosive sublimate. He must next endeavor, by applying agents like iodoform, to prevent formation of poisonous chemical substances in the wound, or to decompose them and render them inactive if once they have been formed."

In the writer's experience, the demand for oakum and jute has almost ceased; absorbent cotton being used instead. Lint is, comparatively, but little used, while borated, carbolated and salicylated cottons are but semi-occasionally called for. Out of the large number of medicated cottons that have been introduced, there is now in strong and active demand but one, namely, corrosive sublimated, or "sublimated," cotton, and the demand is constantly increasing both for it and absorbent cotton.

For the preparation of sublimated cotton, the following formula is recommended:

Mercuric chloride,	35 gr.
Ammonium chloride,	35 gr.
Alcohol,	1 pint.
Boiled water,	4 pints.
Absorbent cotton,	1 pound (av.)

Dissolve the sublimate in the alcohol, add the boiled water containing the ammonium chloride dissolved in it, immerse the cotton, kneading thoroughly, so as to have the antiseptic solution uniformly distributed through it and so that none of the liquid be left. Dry.

The product, when dry, contains one-half of one per cent. of mercuric chloride, in a form not reducible to mercurous chloride by the organic cotton, as occurs after a time, when the corrosive chloride alone is used.

By far the most important of the antiseptic dressings are the

gauzes, especially those impregnated with mercuric chloride and with iodoform; the others, carbolated, naphthalinated and eucalyptol, are in very light demand.

There exists, at present, considerable differences of opinion amongst physicians as to the relative values of "moist" and "dry" gauzes. By the term "moist" gauze is here meant gauzes which are kept permanently moist with alcohol and glycerin. On the one side, it is claimed that moist gauzes are better than dry gauzes, because they contain the antiseptic in the most active form, namely, a soluble form; while, on the other hand, many physicians prefer to use the dry gauzes, either applied dry, as practised by Prof. Keen, or immersed, as is usually done, in the antiseptic solution just before applying, or, if the demand warrants it, as in hospital wards, keeping it in museum jars filled with the antiseptic liquid, preferably of mercuric chloride and ammonium chloride, and removing on using.

As has been before said, there exists a wide divergence of medical opinion concerning the subject of gauzes, and it may be a matter of information to here present some of the arguments used. First, it is urged that if the statement be true that antiseptic gauze is only active when it is moist, it would seem to be also true that "moist" gauze, being active, is constantly undergoing progressive deterioration of germicidal strength; because, accepting the modern teachings as to the omnipresence of disease germs, no container could be kept sufficiently tight to exclude them, and as the containers are frequently opened, the germs of the air are repeatedly coming in contact with it, and, as fast as one colony is destroyed, another takes its place, until the entire germicidal power of the gauze becomes in time nil; whereas, the dry gauze (in which ammonium chloride is present) is a product of constant strength, which, though inactive when dry, becomes actively antiseptic on coming in contact with moisture exuding from wounds. Hence, on application of a moist gauze to a wound without previous immersion, there is no positive guarantee that the gauze may not contain disease germs; while, if the moist gauze be first immersed before applying, wherein exists any superior advantages in its use?

Then, on the other hand, concerning the use of a dry dressing, immersed in antiseptic solution and applied, it is said that, while it is undoubtedly antiseptic, the moist condition has several disad-

vantages. It interferes with the evaporation of the wound secretions; it has a tendency to devitalize the tissues by inducing osmosis, with their contained blood serum, and it is inclined to cause eczema. (See White, Univ. Med. Mag., 1889, 208.)

The tendency of the times seems strongly in favor of following Prof. Keen in his use of dry sublimated dressings, without any previous immersion, who claims to have obtained very superior results with such a method.

For the preparation of iodoform gauze, the following formula is used:

Iodoform,	5 oz. av.
Petroleum benzin,	18 pints.
Purified gauze,	100 oz. av. (about 54 yds.)

Dissolve the iodoform in the benzin, hang the gauze upon an antiseptic clothes-line, in a clean, dry room remote from fire, then saturate the gauze with the benzin solution. When dry, moisten with a mixture of alcohol (2 parts) and glycerin (1 part); cut it into 3-yard pieces. After the alcohol has largely evaporated wrap in paraffine paper with antiseptically clean hands and keep in a closed container, having in it an open salt mouthed bottle containing water (to keep it moist).

The finished product contains 5 per cent. of iodoform. As a solvent, petroleum benzin possesses a number of advantages which make it superior to ether. It evaporates less rapidly and dissolves the iodoform, without decomposition, to form a clear solution, while commercial ethers, even the best, partially decompose the iodoform to set free iodine; forming a light red solution.

The gauze is previously purified in the following way: Boil 100 oz. av. of gauze, or common cheese-cloth, in a tin boiler, having a perforated false bottom, for two or three hours, with 6 gallons of water having had dissolved in it: powdered borax, 8 oz. av. and sodium carbonate, 32 oz. av. Remove, while hot, to a tub containing 2 gallons of solution of chlorinated soda; wring out in this solution, and wash well in not less than three clean waters. Then pass through the wringer, dry, and it is ready for further treatment.

The borax is directed to dissolve the glue, used by manufacturers to stiffen the cheese-cloth, while the washing soda is employed to saponify the fat and dissolve the resin naturally present.

It sometimes becomes necessary to make the iodoform gauze 10, and even 25 per cent. in strength, in which case the benzin method cannot be used, and recourse is then had to the older method of Weir, of iodoform and soap-suds, modified by the omission of mercuric chloride, which, as White has pointed out, results in mutual decomposition of the mercuric chloride and the soap. To use this method, take the iodoform and mix it with ordinary castile soap-suds in the proportion of about 1 to 15; pour this mixture over the purified gauze and distribute it evenly through the meshes by rubbing. When dry, wrap in paraffin-paper.

Dr. La Place, however, prefers to use a pastry mixture of iodoform, ether, alcohol and glycerin to spread over the gauze and exposed to the air until all the alcohol and ether have volatilized.

To make sublimated gauze the following formula is used:

Mercuric chloride,	21½ gr.
Ammonium chloride,	21½ gr.
Boiled water,	6 pints.
Purified gauze,	100 oz. av. (about 54 yds.)

Dissolve the chlorides in the water, immerse the gauze, previously cut into pieces of 3 yards ("short") or 6 yards ("long"), each, in length. Express moderately, or so that no liquid shall be left. Dry in a clean, dry room, upon an antiseptic clothes-line. Remove, wrap in paraffin-paper and keep in a well-closed container. It is, perhaps, needless to say that in all these operations the hands should be kept germicidally clean with "bichloride" solution.

The product contains $\frac{1}{20}$ of one per cent. of the active ingredient. The package should never be opened until about to be used, and then only by the physician, and who uses it either dry or immerses it in the mercurial solution, before applying to the wound.

To protect the edges of the wound from irritation by the antiseptic used, it is usual to employ a piece of oiled silk, coated with copal varnish, and dusted with powdered dextrine (1 part), powdered starch (2 parts) and "$\frac{1}{20}$" carbolic acid solution (16 parts). This is the so-called "Lister-protective." The dextrine and starch are used to give the varnished silk a surface, which will allow a film of water to evenly spread itself over it. It is applied along the entire length of the wound, leaving free the ends from which the drainage tube or catgut protrudes.

To purify sponges, the method given in the National Formulary (p. 121), for bleaching sponges, is followed, with some important modification in details.

After freeing the sponges from sand and any other obvious impurities or damaged portions by beating, washing and trimming, they should be macerated for 12 hours in a solution of hydrochloric acid (8 fl. oz.) and water (1 gallon), to remove lime salts. Then, wash thoroughly with water to remove excess of acid. Next, macerate in a solution of potassium permanganate (240 gr.) in water (1 gallon), wringing them occasionally and replacing it in the liquid, until they become, ONLY, a very light brown color. (Excessive oxidation rots the sponge). Remove, wash well with water, until the latter runs off colorless. Then place in a solution of sodium thiosulphate (hyposulphite) (8 oz. av.) in water (7½ pt.) and add hydrochloric acid (8 fl. oz.), macerate, expressing frequently and replacing in the liquid, until they are sufficiently light in color. Remove, wash well with water to remove every particle of sulphuric and sulphurous acid and store in dry containers.

Prof. Perkins[1] employs sodium bisulphite in place of sodium thiosulphate, in which case no free sulphur is precipitated, but this appears to be an expensive and unnecessary refinement, since precipitated sulphur is readily removed by washing.

For arresting hemorrhages physicians, employ a ligature of either silk (which is but little used), or catgut, the inner media of sheep's intestines. The gut must be perfectly antiseptic, so that it can be left in the wound with a surety that it will be absorbed without septic poisoning. For the purification of commercial guts, which come in five sizes, a, b, c, d, e, or 1, 2, 3, 4, 5, from the finest made to the largest cello string, and which can be procured from importers, wholesale dealers in musical or butcher supplies, the writer follows the method of Lister, modified by Prof. Samuel Gross, as yielding the most satisfactory results. It is: Macerate in stronger ether for 24 hours. Remove, place in a $\frac{1}{1000}$ mercuric chloride solution, one-fifth part by weight of which is alcohol, the rest water, and macerate for 30 minutes; remove, cut into pieces of three or six feet each, dry and place in oil of juniper, to macerate for ten days, after which time it is ready for use, or may be kept indefinitely. To use, remove, wipe off adhering oil with an antiseptic towel, or, better,

[1] West. Druggist, Sept., 15, 1890.

wash with benzin, dry and keep in the $\frac{1}{1000}$ mercuric chloride solution above mentioned.

In some cases, where it is desired that the gut be longer than from five to ten days in being absorbed, as is the case with plain catgut rendered antiseptic, it becomes necessary to chromicize it, when it will resist absorption in from ten days to three weeks. This is done as follows:

Macerate the gut (200 gr.) in stronger ether for 48 hours, remove, dry, cut into 3-foot pieces, and twist on a glass spool, not more than two threads deep, to prevent curling and place in a "$\frac{1}{20}$" carbolic acid solution (10 fl. oz.), which has had added to it chromic acid (1 gr.) (containing no free sulphuric acid); macerate for 48 hours, by which time the color of the solution changes from orange to very light yellow. Remove, dry and place in an air-tight jar, which has been previously antisepticized with a $\frac{1}{1000}$ mercuric chloride solution and dried.

This product will keep for two or three months. To use, immerse for a short time in a $\frac{1}{1000}$ mercuric chloride solution.

In conclusion, there is one subject which, though it does not belong to the class of antiseptic materials, is worthy of notice, because it is very often used in connection therewith, and that is ether. In medicine, practically, ether is almost wholly used as an anesthetic, and, in the writer's opinion, the U. S. Pharmacopœia errs in having two ethers officinal, or in not stating in the text which of the two should be used as an anesthetic. The very wide difference between the several amounts of each required under similar conditions to produce unconsciousness reported by physicians, can be readily understood when it is stated that Æther contains about 26 per cent. of alcohol (probably about 5 per cent. of which is water), while Æther Fortior contains about 6 per cent of alcohol (with a little water). Even with this latter, it is difficult in some cases to produce ready anesthesia, and it would seem to be far wiser to have only one strength, and that a higher one (which can be had in the markets and for which there is now most unquestionably a strong demand), and dismiss the two older and weaker strengths.

Concerning the pharmaceutical preparations which contain it, such as collodion and the simple and compound spirit of ether, it would be a very easy matter to reduce the quantity of ether contained in them and make up the difference in strength with alcohol.

SOME AMERICAN GALLS.

By Henry Trimble.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.—No. 78.

Read at the Pharmaceutical Meeting, October 21.

During the past summer a number of galls were obtained from the oaks and sumacs in the vicinity of Philadelphia. During July a sample was collected from the leaves of young white oaks, *Quercus alba*. They were about the size of a pea and characterized by a covering of purple spines. They were identified by Mr. L. O. Howard, acting entomologist in the U. S. Department of Agriculture, as having been produced by the insect *Acraspis erinacei*. They were submitted to a partial analysis at once and found to contain 17·89 per cent. of tannin. This was the mean of three closely agreeing determinations by the gelatin and alum process. The moisture was found to be 45·95 per cent., and ash, 0·60 per cent. In order to compare the amount of tannin and ash with some further work on the subject, the following figures representing the amount of each in the absolutely dry substance are given—tannin, 32·10 per cent.; ash, 1·11 per cent.

Another gall very common in this vicinity is found on the twigs of the white oak. They are round, smooth, of a waxy lustre, and much resemble very small apples, but they are not quite so large as the Turkish galls. A large number of these were collected in August, and identified by Mr. Howard as "a *Dipterous* gall, made by some species of *Cecidomyia* or *Diplosis*." They were found to contain 73·19 per cent. of moisture, 0·46 per cent. of ash, and as an average of three determinations 9·34 per cent. of tannin. This corresponded to 34·83 per cent. tannin and 1·71 per cent. ash in the absolutely dry galls. Some experience with these galls in previous years had led me to a knowledge of the fact that when they were collected and allowed to air dry slowly, they rapidly deteriorated in tannin strength. It was on this account that all of the galls above mentioned were assayed as soon as collected, although one lot was rapidly dried at a temperature of 100°, and then set aside for some weeks, when they were found to contain the same percentage of tannin, when calculated for absolutely dry material, as those just mentioned, and a number of them were finely powdered.

and submitted to the action of the various plant solvents in succession, with the following results:

	Per Cent.
Soluble in petroleum ether,	0·84
" stronger ether,	1·10
" absolute alcohol,	21·32
" water,	34·90
" dilute soda solution,	12·36
" dilute hydrochloric acid,	3·02
Moisture,	7·00
Ash,	1·80
Cellulose and lignin,	17·41
	99·75

The absolute alcohol extract was composed of 7·56 per cent. tannin, 6·77 per cent. glucose, 5·75 per cent. phlobaphene and 1·24 per cent. undetermined. The aqueous extract was made up of 23·76 per cent. tannin, 7·88 per cent. glucose, 0·71 per cent. saccharose and 2·55 per cent. mucilage.

The tannin of these galls was investigated and found in many particulars to resemble gallotannic acid, but there were several points of difference, so that more material must be obtained and the experiments repeated before the results can be offered for publication.

Another gall was also collected in August from the leaves of *Quercus palustris*, pin oak, and stated by Mr. Howard to have been produced by *Holcaspis globulus*, Fitch. They yielded when fresh 3·91 per cent. of tannin, 0·77 per cent. ash and 58·73 per cent. moisture. This when calculated without moisture shows 9·49 per cent. tannin and 1·87 per cent. ash. This tannin differed in many ways from gallotannic acid, but further statements concerning it are likewise reserved for the present.

About the same time the above were collected, a few galls were found on the leaves of *Rhus glabra*, but the insect producing them was not identified. Unlike the oak galls, they were hollow, and in many other respects they resembled the commercial Chinese galls. They were somewhat pear-shaped, nearly as large as the Chinese variety, but were externally of a greenish color, and became brown on drying.

They were not assayed until they had become air dry, and were then found to contain 61·70 per cent. of tannin, 2·04 per cent. of

ash and 12·93 per cent. of moisture, or for the absolutely dry material, 70·90 per cent. of tannin and 2·34 per cent. of ash.

The tannin of these galls was not further investigated for the want of sufficient material, since all of those collected were found on one bush, and an extensive search over a considerable section of country and among a large number of shrubs failed to yield any more.

I am indebted to my assistant, Mr. J. C. Peacock, for the chemical work, since, without his help, the galls could not have been so promptly assayed in the fresh condition.

THE PROSPECTIVE CAMPHOR INDUSTRY OF FLORIDA.

By John M. Maisch.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, Oct. 21.

The daily papers have recently referred to experiments carried on in Florida with the view of introducing there the production of camphor. Messrs. A. J. Beach & Son, nurserymen, at Palatka, Fla., have, for several years past, paid attention to the culture of the tree, and during the present autumn produced some camphor. Dr. Chas. A. Heinitsh, Lancaster, Pa., has been in correspondence with the firm named, and has kindly placed at my disposal several letters, from which the following information is gleaned, that appears to be of general interest.

The camphor tree grows in Florida in almost any kind of soil, is in a growing condition for about nine months during the year, and is not affected by cold weather. After two or three years, it will grow with little or no care, and even in the poorest land was found to have produced at twelve years a trunk 14 inches in diameter. Another tree, ten years old, had grown two trunks, each 10 feet high and 12 inches in diameter, the total height of the tree being between 35 and 40 feet.

It is apparent from these statements that the camphor tree is of rapid growth. When between four and five years old, it has attained a height of 10 feet and a trunk diameter of 4 inches. From some trees of this size Messrs. Beach cut branches about one inch thick at the base, and with the leaves, subjected them to distillation, the wood and every other part of the tree being rich in camphor. Using an improvised still, the yield from 13 lbs. of branches was a common

teacupful of crude camphor; but it is estimated that about one-half of the product was lost in distillation. The still consisted of a common iron kettle, holding 10 gallons, to which was fitted a wooden cover plastered over with clay, and this was connected with a one-inch galvanized pipe. The kettle was charged with the camphor branches and a small quantity of water, and the distillate was collected in a five-gallon cracker can; the condensed oil, by reducing the temperature, separated the camphor. It is claimed that if cultivated on a sufficiently extensive scale the camphor tree would yield much larger profit in Florida than any other product of the soil. In addition to this, it should be noted that the camphor tree is an evergreen of handsome appearance, and hardy in that climate; that it is not eaten by cattle and other stock, and that in a few years it does not require the protection of a fence, being then strong enough not to be broken down by cattle. It flourishes in almost any soil like the native pine and oak; is not attacked by insects, no loss occurs by the dropping or stealing of fruit; and every part of the tree can be utilized. Messrs. Beach think that in ten years more camphor trees will be growing in Florida than orange trees, and that this industry will prove to be more profitable than the production of sugar. At the present time the price for yearlings is from 25 to 50 cents, and for older trees proportionately more.

From their experience thus far gained, they outline the treatment of camphor trees as follows: At the age of four or five years the first cutting is made for distillation by pruning from the ground to the height at which the head of the tree is to be retained. From that time on, the head is sheared in a suitable manner, without neglecting the pruning from the ground up, with the view of making the head larger. With this treatment, distillation is carried on every year, and in twelve or fifteen years the trunk of the tree will then have attained a sufficient size to be sawn into lumber, so that the valuable camphor wood may also be utilized. The trees being set 15 feet apart, the stumps may be allowed to produce shoots until young trees have been raised and are sufficiently advanced to take the place of the old ones, when the stumps are uprooted and subjected to distillation. It will be seen that nothing goes to waste.

It should be stated yet that the claim of the newspapers of the greater strength of the camphor produced in Florida, as compared with the imported camphor, is erroneous. The specimen here

shown has an odor differing from that ordinarily observed in commercial camphor, the odor of safrol being distinctly recognizable. After the complete separation of the volatile oil with which the camphor is still impregnated to some extent, the properties of the latter, including odor and composition, will doubtless be identical with the corresponding properties of the camphor imported from China and Japan.

THE INDIAN OPIUM TRADE.

By P. L. Simmonds, F.L.S.

Nothwithstanding the alleged prohibitory regulations and the heavy import duty of more than £26 per chest, the consumption of opium in China continues, and the native culture of the poppy is fast becoming extensive.

The 400 million population of the Empire, and those in the Malay Peninsula and other countries of the East, seem to use a great deal of the drug, which is in as large a use as the tobacco leaf in the West.

The opium revenue, after that on land, has hitherto been the most important source of Indian revenue. This is, however, now on the decline.

The total annual revenue derived by the Indian Government two years ago used to be nearly £10,500,000, the Excise opium bringing in under £1,000,000, and the "provision" opium, or that sent to China and the East, the rest. The net revenue has now declined by over £2,500,000.

About 40,000 chests of opium are produced in the native States of Central India, Rajputana and Baroda, which pays a duty on entering British territory, for export from Bombay, but the bulk of the opium is produced in the Bengal Presidency.

The cultivation of the poppy and the manufacture of opium in Bengal are Government monopolies. Though the poppy grows freely in most parts of India, its cultivation in British territory is confined to a tract in the Ganges Valley, 600 by 200 miles in extent, and is strictly prohibited elsewhere. The opium is prepared at the Government agencies at Patna and Ghazipur. The "provision" opium, or that which is intended for export, is then sent to Calcutta, where it is sold by auction at monthly sales. To prevent specula-

tion and to steady prices, the quantity to be sold during the year is duly notified in the previous year.

The following figures indicate the decline in the exports and the countries to which the opium is sent:

	1880—cwt.	1890—cwt.
To Hong Kong,	83,055	76,493
Treaty ports,	46,046	19,997
Cochin China,	—	1,541
Straity settlements,	15,417	20,185
Other countries,	120	383
	144,638	118,599

In view of the steady fall in price of recent years, it is, perhaps, not too much to say that as Indian opium has to a material extent lost its character of a monopoly, having to compete with Chinese opium and that of Persia and other countries, it has followed all other commodities in their relation to gold. China pays for opium with gold, tea and silk, and the value of gold having risen, while the value of tea and silk has fallen in the European markets in relation to gold, it follows that the opium for which they pay must fall, too, unless it is substantially a monopoly in the hands of the Indian producers. This it no longer is, and it is probable that it may fall still further in value and remain permanently at a lower level, unless and until a change is effected in the present state of the currency of the world. In 1881, the chest of opium (which weighs 140 pounds) fetched £185 but it gradually dropped to £111; rather better prices were, however, obtained last year.

The cultivation of the poppy in China has increased enormously, and the quality of the drug has, at the same time, improved. The foreign drug, which has been and still is, though to a lesser degree, preferred, on account of its superiority, has become dearer under the operation of the opium clauses of the Chifoo Convention of 1881, with the result that the native opium is coming into more general use. The country-grown opium, which generally evades duty, is, moreover, cultivated and prepared at less cost; has therefore a distinct advantage over the carefully-prepared and heavily-taxed foreign drug.

The bulk of the exported Indian opium finds its way to China, but the increased cultivation in the Empire itself has caused a considerable decrease in the consignments, both to Hong Kong and to the

Treaty ports. The decrease to China in the last ten years seems to have been as much as 33,000 cwt. Persian opium has also increased greatly in recent years, and, being cheaper than the Indian article, has begun to have a distinct effect upon the market. The foreign exports from India by no means represent the total trade in the drug. There is an immense internal consumption of what is known as Excise opium, averaging about 4,500 chests yearly, weighing about 5,600 cwt. This is retailed to the Indian consumer as a decoction, or in the form of two smoking mixtures known as Chandu and Madak.

OPIUM EXPORTS FROM INDIA IN THE FINANCIAL YEARS ENDING MARCH.

	Chests.	Cwt.
1878,	92,820	126,789
1879,	91,200	125,765
1880,	105,507	144,638
1881,	92,190	127,484
1882,	89,338	123,846
1883,	91,798	126,789
1884,	91,963	126,585
1885,	86,578	118,599
1886,	87,956	120,995
1887,	95,839	131,630
1888,	90,096	125,870
1889,	87,789	122,160
1890,	85,166	118,598

The quantities of the different kinds of opium imported in 1889 into China, added to that held in bond from the previous year, were as follows, in piculs of about 1¼ cwt.:

	Piculs.
Malwa,	36,200
Patna,	26,165
Benares,	18,177
Persian,	3,414
Turkey,	2,414
	86,370

The net imports into China were—

	Piculs.
1888,	82,401
1889,	76,040

The home production is believed now to be as much as that imported, and this would give a total of about 200,000 cwt. As 5 drachms is the calculated average amount used by each smoker daily, the consumption, instead of being general, must be limited to

but a few millions of the population, who consume the 22½ million pounds.

The import of opium into the United Kingdom has been declining the last few years. In 1885, the imports were 710,100 lbs.; in 1889, they had dropped to 492,115 lbs. Of last year's imports the great bulk, 425,255 lbs., was received from Turkey and 19,570 lbs. from Persia. Of the imports of opium in 1889, 409,738 lbs. were re-exported, leaving 82,377 lbs. for home consumption, which is about twice the quantity used in 1850.

THE IODINE ABSORPTION OF ESSENTIAL OILS AS A CRITERION OF PURITY.

A Volunteer Paper.

By H. W. SNOW, Ph.C.

Read at Meeting of the Michigan State Pharmaceutical Association, September, 1890.

In the "New Idea" for March, 1889, p. 19, the writer presented the results of some work performed on the absorption of iodine by essential oils. The work included the examinations of twenty-one essential oils and three stearoptens. These results were meagre, but interesting, and at that time no similar work had appeared in English. Unknown to the writer, however, Mr. C. Barenthin had published, in the Archiv der Pharm., for October, 1886, the results of determinations for eighteen oils, though no translation had appeared in English. The next month, Mr. R. H. Davies published an interesting paper on the same subject, giving the results of determinations of twenty-nine essential oils and four stearoptens. Mr. Davies was likewise unaware of the work done by previous investigators, though he afterwards traced the work of the German pharmacist, and was able to compare it with his own. Six months later, Mr. Rowland Williams, strange to say, wholly unaware of the work done by pharmacists, notwithstanding the discussion it had created in his own country, gave in the Chem. News, October 11, 1889, p. 175, the results of his own work, saying: "To the best of my knowledge, this test has never before been applied to essential oils." Four papers have therefore appeared on this subject, and it is the object of this one to compare the work of the different investigators, to add some further results obtained by the writer, and to draw such conclusions as seem to be warranted from its present status. The

details of the process it is unnecessary to give, simply referring to it as the well-known Hübl's process for determining the iodine absorption of fixed oils and fats.

TIME OF DIGESTION.

The absorption by this method, as applied to fixed oils, is complete in from three to four hours. The writer seems to have been the only analyst who performed any experiments with a view to fixing the proper time of digestion of the iodine solution and essential oil before titrating to determine the excess. The others either ignored the question or assumed that it was completed in the same time as is the case with fixed oils. Barenthin digested his iodine solution and oil together for "three or four hours." Mr. Williams makes no mention of the time, though his failure to specify any different time would lead us to believe that he, too, took the usual time. Mr. Davies, on the other hand, allowed his oils to stand in contact with the iodine "during one night," which would probably be from 15 to 17 hours' time. The writer may give here a tabulated statement of the results of determinations for different periods of time:

	Time of Digestion.					
	3 hrs.	6 hrs.	15 hrs.	24 hrs.	40 hrs.	48 hrs.
Oil Peppermint, .	21·1	22·8	24·5			
" "					179	179
" "					110	110
" "					120	126!
" Bergamot, . .			300			345
" Orange Peel (Bitter), . .			321			362
" Turpentine, .	291	33·3	345	353		397
" Peppermint (Adult), . .		84·7!	74·1!			
" Peppermint (Adult), . .		88·3!	73·6!			
" Thyme, . . .			210!		183!	
Thymol, ...			201!		181!	

From these results, and some observations by Mr. Davies, we may infer that the rate of absorption is not equal for all oils, and perhaps not even for all samples of the same oil. Also, it is evident

that, in many instances, the absorption is not complete within a period of twenty-four to forty-eight hours; though in four instances the longer digestion shows less absorption than the shorter period. This same phenomenon was also noticed later in the case of turpentine with simple chloroform solution of iodine.

These experiments are not in themselves sufficient to fix the proper length of time in which the oils and iodine should remain in contact, but in the writer's work 40 to 48 hours was at first allowed. This, however, is too long for practical purposes, and a conventional time will probably have to be adopted. The "standing over night," or a period of about 16 hours, recommends itself to the writer, and in recent work has been followed.

COMPARISON.

In the following tables, the results obtained by the different operators are placed side by side for comparative purposes. It must be borne in mind that the difference in time allowed by the different operators may produce different figures. Mr. Williams and Mr. Barenthin having evidently operated during the same length of time; it is possible to compare their results. The writer's later work, however, that in the fourth column, was performed with about sixteen hours' digestion ("over night"), and can, therefore, be compared with that of Mr. Davies. The number of oils examined was limited, but I may say that those given in column four were of my own distillation, and their purity is therefore assured.

Oil.	Barenthin. Time, 3 to 4 hrs.	Williams. Time, 3 to 4 hrs.	Davies. Time, about 16 hrs.	Snow. Time, about 16 hrs.	Snow. First work	
					15 hrs.	40 hrs.
Oil Almonds,			*None.			
" " (prussic acid, free),			*None.			
" Aniseed,		274·4				121·0
" "		185·9				
" " Russian,			189·7			
" " star anise,				186·0		
" Bergamot,	260·0	247·9	276·1		300·0	345·0
" "		283·7				
" Birch, see Winter-green,						
" Cajeput,		70·8				
" "		151·0				
" Chamomile,			*68·1			
" "			*72·1			
" "			65·5			
" Calamus,	155·0		181·4			
" Camphor,						129.0
" Caraway,	265·	258·3	*254·9			233·0
" "		263·2				
" Cardamom,			*139·3			
" Cassia,		75·1	159·5			
" "		71·7				
" Cedar wood,		78·5				
" "		74·8				
" Celery,			*311·6			
" Cinnamon,	100·0	128·1	189·5			
" "		105·1				
" Citron,		359·7				
" "		320·0				
" "		353·9				
" Citronelle,		191·3				
" "		186·3				
" Cloves,	270·0	179·8	*362·5	354·0		467·0
" "		155·5	*355·1		291·0	
" "			*349·5			
" " (half from stems),			*366·6			
" Copaiba,				260·0		250·0
" Coriander,						385·0
" Cubebs,			226·8	268·0		
" "			223·1			
" "			226·0			
" Cummin,			81·6			
" Dill,			*257·1			
" Erigeron,						280·0
" Eucalyptus,	235·0	61·7				
" "		106·5				
" "		110·7				
" Fennel,	140·0		158·3	175·0		
" Juniper,	245·0	273·6	*337·3			
" "		236·1	363·9			
" "		250·1				

Oil.	Barenthin. Time, 3 to 4 hrs.	Williams. Time, 3 to 4 hrs.	Davies. Time, about 16 hrs.	Snow. Time, about 16 hrs.	Snow. First work	
					15 hrs.	40 hrs.
Oil Lavender,	170·0					286·0
" " Eng.,		232·9	265·5			
" " " Mitcham,		230·4	273·9			
" " " "		248·6	274·9			
" " (French),		198·6	294·5			
" " "		237·2	262·7			
" " "		199·2				
" " Spike,		287·9				
" " "		207·1				
" Lemon,	285·0	323	328·3			343·0
" "		320·2	340·3			
" "			345·3			
" "			348·9			
" "			348·0			
" "			345·6			
" "			355·1			
" Lemon grass,		223·2				
" " "		271·5				
" Limes,						289·0
" Mace,		220·8				
" "		224·0				
" Nutmeg,		201·9	*308·3			
" "		206·2	321·5			
" Orange,		347·7				
" "		341·7				
" " Bitter,					321·0	362·0
" Origanum,	227·0					
" Parsley,			255			
" Peach Kernel,			None.			
" Pennyroyal,		85·9	188·9			152·0
" "		78·6				
" Peppermint, Amer.,		71·7	132·2			179·0
" " "		53·1	143·9			109·0
" " "			121·8			146·0
" " "						113·0
" " "						71·0
" " Eng.,		36·8	51·2			
" " "		46·4	49·6			
" " "			57·7			
" " Jap.,		56·1	48·1			64·0
" " "		37·1	43·5			
" Petroleum,				Small am'ts.		
" Rosemary,	185·0	161·7	325·			
" "		142·4				
" Rue,		192·0				
" "		121·3				
" Sage,		49·7				
" "		117·0				
" Sandal wood,			226·6			
" "			233·9			

Oil.	Barenthin. Time, 3 to 4 hrs.	Williams. Time, 3 to 4 hrs.	Davies. Time, about 16 hrs.	Snow. Time, about 16 hrs.	Snow. First work	
					15 hrs.	40 hrs.
Oil Savine,			279·5			
" Sassafras,		162·7				166·0
" "		151·0				
" Spearmint,			207·3			
" Thyme,	170·0				210·0!	183·0!
" " (red),		181·5				
" " "		168·4				
" Turpentine,	300·0		377·0		345·0	397·0
" Valerian,	80·0					
" Verbena,		267·8				
" "		247·8				
" Winter-green, true,						1·0
" " (oil birch),						3·3
" " synthetic,						3·8
Anethol,			177·4			
"			182·9			
"			177·8			
Camphor,			0·46		2·8	
Menthol,			0·12			None.
Thymol,			171·5		201·0!	181·0!

The writer will not attempt to pass any extended remarks on these figures. A critical examination of them speaks for itself. However, attention may be directed towards Aniseed, Cassia, Cinnamon, Cloves, Eucalyptus, Juniper, Nutmeg, Pennyroyal, Peppermint, Rosemary and Sage.

As regards purity, it may be said that Mr. Williams obtained the oils under assurance of their purity, the purpose to which they were to be put having been specified. Mr. Davies felt the "utmost confidence in the genuineness" of those oils marked in this table with an asterisk. Some of the oils used by the writer were distilled in small quantities by himself, for the purpose of this examination, viz: those in column four. The others were purchased in open market from good sources, though no mention was made of the purpose to which they were to be put.

CHLOROFORM IODINE.

The long time required to complete the reaction in the use of Hübl's solution, the instability of this solution and certain peculiarities which it exhibited led the writer to try a simple chloroform

solution of iodine, the process being otherwise conducted the same. The results as obtained in different periods of digestion are very different to those obtained by the use of Hübl's solution and the action may be said to be more rapid though it is not uniform for all oils. The results are given in the table for a limited number of oils as follows:

	Time of Digestion.								
	4½	7½	8	18½	22	24	49	55	Hübl's.
Oil turpentine, .	98	91			80				397
" peppermint,	46	48			50				113
" copaiba, . .	81			81					250
" coriander, .	81			78					385
" cloves, . .	29			56		72	122	121	291
" camphor, .	45		53						129
" limes, . . .	67		62						289
" sassafras, . .	35		43						166

FRACTIONAL DISTILLATION.

The writer scarcely looks for a close degree of uniformity in the "iodine numbers" of essential oils. It is scarcely to be expected that bodies of such complex composition as these essential oils will furnish "constants" in the ordinary use of the term. The variations in specific gravity and boiling points, as well as the variable specific rotatory power of those that are optically active, are well known. The iodine number, as already reported upon, is in some cases quite constant. In casting around for some means of partially compensating for this, the writer naturally first thought of fractional distillation. Some of the advantages which accrue from it were pointed out in a paper on Oil of Peppermint, in which it was shown that a fraction of one dram from one ounce of oil of peppermint did not have a much higher absorption number than the oil undisturbed by fractional distillation. The figures, as then obtained, were 105 for the natural oil, and this yielded a one-eighth fraction having 123 for the number, while the pure oil, to which was added 13 per cent. of turpentine, yielded 280 for its iodine number. At that time experience justified the statement that an oil yielding, from the fraction of one dram from one ounce, less than 125, for its iodine absorption is not

very likely to be adulterated with turpentine. Only once thus far has the writer found an oil having a higher absorption in the original than this, and, as already stated, that oil is still open to question. If the oil exceeds 125 it is a suspect, and running over 185 may be discarded. With much turpentine present the fraction will have an absorptive power over 225.

Since then, an oil examined by more thorough fractional distillation, taking one-eighth of one-fourth, the distillation being conducted in a 4 oz. fractional distillation flask, showed 146 and 223. Notwithstanding the fact that, by the statement above, this oil should have been excluded, it was passed. If it contained any turpentine, the amount was too small to be of any consequence. The high number of *oil of cloves* would indicate that iodine absorption would not be of much value in detecting turpentine if added. The ordinary turpentine of commerce cannot be used as an adulterant to any advantage. Some trials by the writer showed conclusively that 1 in 8 could be readily detected by the nose, 1 in 16 was not so apparent and would pass, but when one-eighth was distilled in a small retort, the fraction was all terebinthinate in odor, with only a faint suggestion of cloves. The oil pure, oil pure one-eighth fraction and the oil to which one-sixteenth of its volume of turpentine was added, showed iodine numbers (the time being 17 hrs.), as follows: 354, 364, 370; the indications so far as iodine numbers were concerned. The same oil and fractions were then tried with simple chloroformic iodine; bearing in mind that oil of cloves absorbed slowly, while turpentine was highest in a short period, only two hours' digestion was allowed. Results were as follows: 54 for pure oil, 60 for the fraction and 100 for the fraction containing turpentine; with oil of camphor, somewhat similar results were obtained. Oil of camphor, one volume, was added to seven volumes of the same oil of cloves, as in the preceding. Its presence was not noticeable by the sense of smell, but in the fractions could be distinctly noticed; with Hübl's solution, the iodine numbers were 354, 364, 332. This completes the writer's work to the present. Fractional distillation promises well in connection with this line of investigation. It is hoped that others will follow up the subject, as it is my intention to collect data as rapidly as other duties will permit.

ON THE MEDICINAL VALUE OF POMEGRANATE BARK.

By J. B. Nagelvoort.

In *N. Tijdsch. v. Phar., Chem., Toxicol.*, Oct., 1890, Professor W. Stoeder, of the University of Amsterdam, Holland, gives the following information concerning the use of pomegranate bark by the natives of East India (Java):

The natives prefer the bark of the root of trees with *white* flowers, to expel tænia. There is also a variety with *black* flowers. Trees with *red* flowers are, however, in Java, the most common, as is the case in Europe. On submitting the root-barks of the 3 varieties to the assay process of the Dutch Pharmacopœia,[1]

The white-flowered variety yielded 3·75 per cent. of hydrochlorates.
" black " " 1·71 " "
" red " " 2·43 " "

I take pleasure in bringing these observations of Professor Stoeder to the notice of the pharmaceutical chemists of this country, and at the same time desire to direct attention to a statement of mine, made some years ago (see *Hager, Phar. Praxis*, Erg. Bd., p. 503), that experiments made in Batavia had shown no difference in the effects of the bark of the root and branches. At that time, reliable assays of pomegranate bark were not generally known, and I used indiscriminately the bark of the whole tree, or, to be more correct, of the large shrub.

It is the place here to call the attention of the readers to the fact that the *root-bark* of the cinchonas contains some cinchona alkaloid; and that emetine is found, if I remember correctly, in the woody part of the ipecacuanha root, always considered worthless.

Professor Stoeder does not state if his figures are averages. From a perusal of the original, I am inclined to think that they are the

[1] The following is the process: 10 gm. of the bark, reduced to a fine powder, are mixed with 2 gm. slaked lime, 100 cc. water, and 2 gm. solution of caustic soda, 1·33 sp. gr.; macerate for 24 hours, under frequent agitation; transfer to a percolator and displace with small quantities of water to exhaustion. Agitate the percolate in a separator with chloroform, taking small quantities in succession, to exhaustion. Exhaust the chloroformic solution in another separator, first, by strongly agitating it with 10 cc. water, acidulating carefully with nHCl, and afterwards with 5 cc. water alone. (Repeat this as long as Mayer's reagent gives a reaction for alkaloid.—J. B. N.) Evaporate, on a water-bath, the combined watery fluids, dry above H_2SO_4 to constant weight. 10 grams of drug shall yield not less than 0·1 gram hydrochlorate of total alkaloid.

results of the analysis of one sample. The large variations I find daily in alkaloid or other active principle of important drugs[2] make this suggestion necessary. This does not belittle in any way the value of estimating alkaloidal strength, over the old way of trying Extractum Punicæ Granati on its physiological effect only, as I did. Assays of the tree-bark are desirable, however.

CHEMICAL NOTES.

By Henry C. C. Maisch, Ph.G., Ph.D.

The Fruit of Erythroxylon Coca. C. J. H. Warden (*Pharm. Journ. and Trans.*, 1890, xxi, 1) analyzed coca fruit, grown near Calcutta, according to Dragendorff. He found: I. moisture, 5·423 per cent. determined at 100° C. after partial desiccation over sulphuric acid; II. petroleum ether extract, 4·540 per cent., containing 3·021 per cent. glycerides of fatty acids and 1·519 per cent. impure phytosteric and coloring matter; III. ether extract, 0·44 per cent., the solubilities being as follows: petroleum ether dissolved, 0·232 per cent.; water, 0·110 per cent., containing cocaine; absolute alcohol, 0·069 per cent.; the remaining 0·029 per cent. being only soluble in ether; IV. extract with absolute alcohol, 3·820 per cent., containing cocatannic acid and trace of alkaloid; V. aqueous extract, 23·44 per cent.; VI. ash, 4·271 per cent.

On a Cocaine double salt. W. Miller (*Pharm. Zeitg.*, 1890, xxxv, 522) obtained, by mixing concentrated solutions of mercuric chloride and cocaine hydrochloride, a double salt having the composition $C_{17}H_{21}NO_4,HCl,HgCl_2 + 2H_2O$ as a voluminous precipitate. Washed and dried in a desiccator, the salt appears to be finely crystalline. At 124° C. the salt melts to a clear, colorless liquid which on cooling forms a turbid mass. Besides possessing the anæsthetic property of cocaine, it also has, when brought on the tongue, a distinct metallic taste.

A new Alkaloid from Chrysanthemum cinrariæfolium. F. M. Zuco (*Rendiconti d. Acad. dei Lincei (Roma)*, 1890, (vi, 571–575) obtained from the flowers of the above plant by treatment with ether two crystalline bodies, one of which is a paraffin and the other a

[2] Belladonna root with 1 per cent., instead of 0·4 to 0·5 per cent. alkaloid, as usual. Cantharides with 1·2 per cent. cantharidin against 0·3–0·5 per cent. as given in text-books on pharmaceutical chemistry.

higher homologue of cholesterin. On treating the flowers now with alcohol, the author obtained a crystalline glucoside in small quantity. The alcoholic extract furthermore contains an alkaloid, ***chrysanthemine*** which is very soluble in water. This solution can be evaporated on the water-bath without affecting the alkaloid; if pure, this forms a colorless syrupy liquor. Most of the salts are not crystalline, and are soluble in water, alcohol and ether. The characteristic salt is the gold chloride double salt; it crystallizes in small golden-yellow needles, very soluble in hot, and slightly so in cold water, easily soluble in alcohol and also in a mixture of equal volumes of alcohol and ether. Potassiobismuthic iodide turns the salts to an orange-color, while potassio-mercuric iodide gives a yellowish-white color. Platinum chloride, picric acid, tannin and phosphotungstic acid produce no precipitate. The formula of the gold salt is $C_{14}H_{30}O_3N_2Au_2Cl_8$, the hydrochloride then having the formula $C_{14}H_{30}O_3N_2Cl_2$.

At the meeting of physicians and scientists at Bremen, August 15—20, 1890, Dr. H. Thoms (*Chem. Zeitg.*, 1890, p. 1284) reported an analysis of the foregoing flowers. He succeeded in isolating an ethereal oil; a volatile acid; a wax; a non-volatile, balsam-like acid; chlorophyll; a resin acid; tannin; an alkaloid (see above); a glucoside, and sugar. Physiological experiments, in which *Blatta orientalis* was the subject, showed that the petroleum ether extract, consisting of the ethereal oil and volatile acid, had the toxic effect. The non-volatile acid, although being disagreeable to the insects, had no toxic effect, while the glucoside seemed to be relished by the roaches. Besides these the experiments of Schlagdenhauffen and Reeb (see this volume, p. 456) also show that the toxic property resides in the volatile acid. Dr. Thoms gives the following method as furnishing a criterion for the value of this insect powder. The powder, which has been dried at 100° C., is exhausted in an extraction apparatus with petroleum ether, the solvent evaporated and the extract heated to 80° C. until constant in weight. The residue thus obtained is brownish-yellow in color, has the consistency of a salve and a strong odor of the flowers. From one specimen the author obtained 5·34 per cent. of residue; from others the amount of residue was between 5·003 and 3·89 per cent. Besides this assay, the microscopical examination and the estimation of the ash are necessary to obtain the information whether or not the insect powder is adulterated.

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph.G.

Preparation of methyl phenacetine.—According to the German patent granted to the Farben-fabriken (formerly Friedr. Bayer & Co.), *p*-acetphenetidine (phenacetine) is dissolved in xylol and to the boiling solution metallic sodium is added; phenacetine-sodium soon separates in white needles which is then treated with methyl iodide forming methyl phenacetine and sodium iodide. The former is soluble in xylol and is separated from the latter by filtration; the filtrate is freed from xylol by distilling in a current of steam, and the remaining oil after drying is distilled in a vacuum; between 295° and 305° C. methyl phenacetine distils as a colorless oil which, after standing, solidifies. An oily body (a side product in the manufacture) is removed by expression and the methyl phenacetine purified by crystallization from ether or alcohol. The purified substance melts at 40° C., is moderately soluble in water, easily soluble in ethereal solvents.—*Chemiker Ztg.*, 1890, 1355.

Carvacrol iodide.—Substituting carvacrol for thymol (see Amer. Journ. of Pharm., 1890, 129) in the preparation of aristol an iodine derivative of similar properties is obtained, the only difference between the two being in their behavior towards light; aristol is decomposed, the new body is not. In the patent granted to the Farben-fabriken, the following proportions of the chemicals used are given: A dilute solution of 1·5 kilos carvacrol in 1·6 kilos sodium hydrate is mixed with 10·16 kilos each of iodine and potassium iodide and the mixture made alkaline; the yellow precipitate obtained, purified by washing with water, forms after drying a yellowish-brown powder, and melting at 90° C. Patents have also been granted for iodine derivatives of phenol, resorcin and salicylic acid, which are all made in a similar manner. These substances are to be used for pharmaceutical purposes.—*Chemiker Ztg.*, 1890, 1355.

Lanolin, a vehicle for acid and saline solutions.—Prior to the use of lanolin, the introduction of such solutions into the dermatological practice was impossible; Unna recently published the following formulas:

Unguentum Aceti.—Aceti, 4·00; Unguenti simplicis, 20·0; Lanolini, 1·00 (camphoræ, 0·5–1·0). The addition of camphor in this ointment is to be recommended.

Unguentum Aluminii acetici.—Liquoris Aluminii acetici, 40·0; Unguenti simplicis, 20·0; Lanolini, 10·0.

Unguentum Calcii bisulfurosi.—Solutionis Calcii bisulfurosi, 40·0; Unguentum simplicis, 20·0; Lanolini, 10·0. The commercial solutions of bisulphite of calcium range in specific gravity from 1·06 to 1·10 at 15° C.; an average solution sp. gr. 1·08, contains 5·61 per cent. $CaSO_3$ and 4·88 per cent. free SO_2. If the calcium bisulphite solution be mixed with anhydrous lanolin, an ointment is obtained which does not evolve SO_2; by mixing this ointment with water SO_2 is liberated. If, however, the lanolin be mixed with a glycerin-fat, as in the above formula, the mixture acts as a rich reservoir of SO_2. Calcium bisulphite solution is used instead of aqueous sulphurous acid, because the sulphuric acid formed by oxidation of the sulphurous acid will unite with the calcium, and only the action of SO_2 is obtained.

Unguentum Hydrogenii peroxydati.—Solutionis Hydrogenii peroxydati, 20·0–40·0; Vaselini, 20·0; Lanolini, 10·0. To retard the action of the H_2O_2 an addition of vinegar may be made. This ointment is an excellent article to remove comedones.

Unguentum Calcii chlorati.—Solutionis Calcii chlorati (33·3 per cent.), 40; Unguenti simplicis, 20·0; Lanolini, 10·0. This neutral calcium chloride ointment is useful as a base in the treatment of Acne Ichthyosis, etc ; additions of zinc ointment, precipitated sulphur, hydrogen peroxide, resorcin, etc., may be made in such treatment.—(*Therapeut. Monatshefte*) *Pharm. Centralhalle*, 1890, 549.

Rancidity of fats has been very carefully investigated by D. E. Ritsert, with the following results: Rancidity is not due to the presence of bacteria, as sterilized fats will become rancid; it is due to a direct oxidation of the fat by the oxygen of the air, and is intensified by exposure to light. Fats carefully protected from the atmospheric oxygen if exposed to direct sunlight will not become rancid. The presence of moisture is not regarded as essential to the change. To preserve fats, the first condition to be complied with is to absolutely prevent access of air; this attained, it is immaterial if the fat be exposed to light or not.—*Pharm. Ztg.*, 1890, 579, 586 and 602.

The red color of sulphuric acid, noticeable quite frequently in the commercial acid, is due to the presence of small quantities of ferrous iron, and at the same time of some of the oxides of nitrogen. The

iron impurity is introduced by keeping the acid in iron containers (an acid of 66° B. will not dissolve iron, but one of the strength of 60° B., will dissolve small quantities). The best means of preventing the red color is to denitrate the acid by addition of a little ammonium sulphate; the color may also be discharged by heat.—R. Nörrenberg (*Chem. Industrie*), *Pharm. Ztg.*, 1890, 595.

Recovery of silver and gold from potassium cyanide solutions.—To recover *silver* it is only necessary to suspend a piece each of sheet zinc and sheet iron in the solution for two days, collect the fine deposit of silver which, however, generally contains some copper, wash, dry, dissolve in concentrated sulphuric acid, dilute with water and precipitate the dissolved silver by suspending a strip of copper in the solution.

To recover *gold* add to every 100 litres of solution one-half kilogram zinc dust, agitate frequently during two or three days, collect the precipitate containing gold and quite often silver and copper, wash, and, by treatment with hydrochloric acid, remove the excess of zinc and then by use of nitric acid the silver and copper; the residue remaining will be pure gold.—Stockmeier and Fleischmann (*Industrie Blätter*) *Chem. tech. Central. Anzeiger*, 1890, 373.

A new albumin test.—To 8–10 cc. of the suspected urine add an equal volume of strong hydrochloric acid and then, without agitation, with a pipette 2–3 drops of a concentrated solution of chlorinated lime; the presence of $\frac{1}{100}$ per cent. albumin will cause a white turbidity in the upper part of the test. By diluting albumenoid urine with known quantities of water until the test in the diluted urine is no longer obtained a rapid and approximate estimation of albumin may be made.—Dr. A. Jolles (*Fresenius Ztschr. f. an. Chem.*) *Pharm. Post*, 1890, 781.

The preparation of pure gases, carbon dioxide, sulphur dioxide, etc., is conveniently carried out by mixing acid sulphate of sodium with the acid or neutral salt which contains the gas desired. To make CO_2, for instance, the acid carbonate and acid sulphate of sodium are taken in molecular proportion, placed in a generating flask and a little water added; a steady and prolonged evolution of pure but moist gas results.—H. Bornträger (*Ztschr. f. an. Chem.*) *Rpt. der Pharm.*, 1890, 213.

Linoleic acid.—The formula of this acid has been ascertained to

be $C_{18}H_{32}O_2$, and not $C_{16}H_{28}O_2$. By treatment with fuming hydriodic acid a compound of the formula $C_{18}H_{35}O_2I$ was obtained, which by reduction with zinc and hydrochloric acid and subsequent purification was found to yield stearic acid $C_{18}H_{36}O_2$.—A. Reformatzky (*Journ. f. prakt. Chem.*) *Rpt. der Pharm.*, 1890, 214.

Solubility of ether in sulphuric acid.—A German patent has been granted the firm J. D. Riedel for the purification of ethyl bromide in which the ether present in the crude ethyl bromide is removed by treatment with sulphuric acid. The behavior of ether towards sulphuric acid is variously stated in works on chemistry, so the following results of investigations are interesting: Ether dissolves easily in sulphuric acid with production of considerable heat. No chemical combination takes place even after prolonged standing, the ether being separable again by addition of water. Prolonged heating (for 30 hours) at 100° C. results in the formation of large quantities of ethyl sulphuric acid, $C_2H_5HSO_4$, with smaller quantities of diethyl sulphate $(C_2H_5)_2SO_4$; stronger heating brings about decomposition into SO_2, C_2H_4 and H_2O.—Dr. L. Scholvien, *Apoth. Ztg.*, 1890, 607.

Phenylurethane or Euphorine, as it has been called lately, has the formula $CO<\begin{matrix}OC_2H_5\\NH(C_6H_5)\end{matrix}$, is a white crystalline powder of a faintly aromatic odor and gradually developing taste, resembling cloves; it is difficultly soluble in water, easily soluble in alcohol and sufficiently soluble in wines to be administered in such solutions.—*Pharm. Centralhalle*, 1890, 616.

Morphine estimation.—The Helfenberger morphiometric assay of opium (adopted in the new German Pharmacopœia) has been so modified that an assay can be made in less than three hours without decrease of accuracy; the differences in morphine-yield are generally less than 0·3 per cent. Six grams of finely-powdered opium are triturated with six grams water, diluted with more water, the mixture rinsed into a tared flask and water added to make 54 grams. After frequent agitation during fifteen minutes it is filtered through a plaited filter of 10 cm. diameter; 42 grams filtrate are mixed with 2 grams of a mixture (made by adding 83 grams water to 17 grams ammonia solution) by a rotatory motion (not by agitation), and filtered at once through a plaited filter of 10 cm. diameter. To 36 grams of this filtrate in a tared flask are added 10 grams acetic ether, mixed by a rotatory motion, 4 grams of the above

diluted ammonia solution added, the flask corked and agitated thoroughly for 10 minutes. To separate the emulsion formed 10 grams additional acetic ether are added, the ethereal layer carefully poured off, and after addition of 10 grams acetic ether, the ethereal solution again decanted and the contents of the flask poured into a plain filter of 8 cm. diameter; the flask and filter are twice washed with 5 grams water saturated with acetic ether, and after allowing to drain, both flask and filter are dried at 100° C., the filter contents transferred to the flask and the latter dried to constant weight.—E. Dieterich, *Pharm. Centralhalle*, 1890, 597.

Loof's morphine estimation in opium (AM. JOURN. PHARM., 1890) has been critically examined by E. Dieterich; the conclusions based upon numerous assays are here given: 1. The use of oxalic acid is unnecessary, as the calcium salts present in opium are not precipitated by potassium carbonate until after 10–12 hours' standing. 2. The filtration of the precipitated narcotine often proceeds so slowly that thrice the time given by Loof is necessary to filter off the required quantity; after one-half minute's standing, the morphine will commence precipitating. 3. The precipitation of narcotine is not immediately complete, as stated; narcotine contaminating the morphine obtained. 4. Potassium carbonate has no advantages over ammonia in precipitating morphine, as this alkaloid is soluble in excess of both precipitants to the same extent. 5. By weighing the morphine from only one gram of opium any slight error in the estimation becomes of considerable importance when the results are given in percentage.—*Pharm. Centralhalle*, 1890, 591.

Azoimide, a new hydrogen nitride.—One of the most interesting announcements in chemical research is the discovery of an *acid* containing only the two elements, *hydrogen* and *nitrogen*. The acid in many respects is analogous to the halogen acids; it forms a gas of penetrating odor, is easily soluble in water and has a strong acid reaction; but differs in having the formula HN_3 explained by the structural formula $H—N\begin{matrix}/\ N \\ \|\ \ \\ \backslash\ N\end{matrix}$ With ammonia it forms white fumes of NH_4N_3 or N_4H_4; metals are rapidly dissolved by it with evolution of hydrogen. The barium, mercurous and silver salts, BaN_6, Hg_2N_6 and AgN_6 respectively, have been prepared; the last two are very explosive. The acid is obtained by a series of organic reactions

which result in the formation, among other products of the sodium salt, NaN_3, which by treatment with sulphuric acid gives the new compound.—Dr. Curtius, *Pharm. Ztg.*, 1890, 623.

ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

PREPARATION OF BENZOATE OF MERCURY.—Two solutions are made, the first containing: Mercuric oxide, 125 gm.; nitric acid sp. gr. 1,20), 250 gm.; distilled water, 4,000 gm.; and the other containing: Benzoate of sodium, 188 gm.; distilled water, 4,000 gm. The solutions are slowly mixed while stirring. A white, voluminous precipitate is formed, which is taken up on cloth and washed with distilled water until no acid reaction can be obtained. The precipitate is then dried in a stove; it is a white, light powder, wholly insoluble in water, but soluble with heat in solutions of chloride of sodium. The preparation for hypodermic use is made as follows: Benzoate of mercury, 30 cgm.; chloride of sodium, 10 cgm.; hydrochlorate of cocaine, 15 cgm.; distilled water, 40 gm. This gives a limpid solution, but the presence of cocaine causes the precipitation of a small quantity of the mercury. The amount usually given is the contents of a Pravaz syringe, once daily, until 15 to 30 injections have been administered. The formula is that used by Drs. Balzer and Thiroloix in the treatment of syphilis.—*Jour. de Méd.*, Sept.

TEST OF SALICYLIC AND SALICYLURIC ACIDS IN URINE.—M. Grenouillet (*Jour. de Ph. et de Ch.*, Sept. 1), evaporates 500 ccm. of urine to 150 ccm. After filtering and cooling, he agitates the liquid with 150 ccm. of ether. On evaporation of the ether, the residuum is taken up by boiling water and this gives, with perchloride of iron, the violet coloration characteristic of salicylic compounds. As the coloration may be due to either salicylic or salicyluric acid, it is necessary, in cases in which it is desirable to know which of these substances is present, to heat the residuum obtained after the evaporation of the ether, when the salicylic acid volatilizes. Benzin may be employed in place of ether. The author used this method in recent examinations of urine containing naphthalol (or naphthosalol), a salicylate of phenol. As his experiment was successful, he

concluded that this compound changes in the system, where it is decomposed into salicylic and salicyluric acids.

LEAD POISONING FROM FLOUR.—M. Lemaistre reports the cases of 120 persons poisoned by the use of flour prepared in a mill (at Limoges) whose burr stones had been repaired by filling their cracks with lead. None of the patients died.—*Jour. de Méd.*, Oct. Wholesale poisoning from the same cause was reported in AMER. JOUR. PHAR, 1866, p. 366.

VIGIER'S EMBROCATION FOR CHAPPED HANDS.—The formula is given in the *Jour. de Méd.*, Oct., as follows: Tannic acid, 50 cgm.; neutral glycerin of 30° B., 20 gm.; rose water, 200 gm. Other French preparations for the same purpose are formulated in the same journal, as follows: A. Lanolin, 50 gm.; vanillin, 10 cgm.; essence of rose, 1 drop. B. Lanolin, 100 gm.; paraffin, 25 gm. vanillin, 10 cgm.; essence of rose, 1 drop.

BESNIER'S PREPARATIONS FOR CHILBLAINS.—The *Jour. de Méd.*, for October, gives the following: Bathe the extremities in a decoction of oak leaves and wipe dry. Apply camphorated alcohol with friction. Powder the surfaces with a mixture of salicylate of bismuth, 10 gm. and starch, 90 gm. To quiet the nocturnal itching apply the following: Glycerin and rose-water, of each 50 gm.; tannic acid, 10 cgm. Then powder the parts, as before, with the bismuth and starch mixture. In case ulcerations are present they should be dressed with oak leaves softened by soaking in water.

QUICK TEST FOR MINERAL ACIDS IN VINEGAR.—M. Balzer writes to the *Répert. de Phar.*, for October, that he has abandoned the old method of testing with starch and iodine, on account of the time required for it. He uses instead a very weak aqueous solution of methylaniline violet. A few drops of the vinegar to be tested is poured upon a plate where it is agitated with a glass stirrer previously dipped in the methylaniline solution. If mineral acids are present the violet coloration disappears and is replaced by a well-marked tint of blue or green. Sulphuric and hydrochloric acids give the green shades; nitric acid produces a blue coloration.

GLYCERIN SUPPOSITORIES.—M. Balland (*Union Phar.*, September 15th), makes a satisfactory suppository in accordance with the following formula: Lanolin, 2 gm.; glycerin, 2 gm.; cacao butter, 1 gm.; white wax, 1 gm. The lanolin is first melted with the wax and the cacao butter. Then the glycerin is added and the mass is

poured into molds. The molds should be placed in a mixture of ice and salt to prevent a separation of the glycerin. The suppositories are divided so as to weigh 6 gm. each, which is heavier than ordinary suppositories, though the bulk is not much greater.

HASCHISCHINE.—Since the publication by Sée and Égasse of their articles on cannabis indica and the statement by the former that it was a true stomach sedative and valuable in certain stomach affections accompanied by painful symptoms, its use appears to have increased in France. The preparation recommended by Sée is known as "the fatty extract." To make this, the drug is digested in butter (see *Répert. de Phar.*, October), or it may be made by dissolving 5 per cent. of haschischine in 95 per cent. of butter. Of this, Sée recommends 5 cgm. daily, in three doses. Larger quantities produce inebriety. Gastinel's haschischine is simply the resin. The *Répert. de Phar.* thinks that this substance should be presented in a more stable and convenient form than that recommended by Prof. Sée, and proposes making it up in granules to contain one milligramme of the drug. Three of these (corresponding to 6 centigrammes of M. Sée's fatty extract) could be administered daily. The same writer thinks that cannabinon, cannabine, cannabeine and tannate of cannabine should be banished from therapeutics as uncertain and unstable preparations.

MONIN'S "KOLA ESSENCE STIMULANT," is formulated in the *Bulletin Méd.* as follows: Essence of kola, 40 gm.; tincture of canella, 5 gm.; essence of menthe, 10 drops; flavored, mucilaginous water, 100 gm. To be taken during the 24 hours. The kola essence is made from roasted kola. A given quantity of the essence represents one-half, by weight, of the nut.

HOECKEL'S TINCTURE OF KOLA is made as follows: Tincture of kola (5 per cent.), 10 gm.; tincture of vanilla, 10 drops; simple syrup, 60 gm.; distilled water, 40 gm. An *elixir* is prepared by adding 125 gm. of kola tincture, to 275 gm. of Garus elixir. Of the latter, two to four tablespoonfuls may be taken daily.

KOLA PILLS.—Extract of kola, 10 gm.; powdered kola, q. s.; divide into 100 pills; 10 to 15 of these may be taken daily.

KOLA MIXTURE.—Extract of kola, 1 gm.; syrup of cydonium, 60 gm. This quantity is to be given in teaspoonful doses daily for diarrhœa of children.

ON THE INFLUENCE OF ALKALIES ON TISSUE-CHANGE IN MAN.[1]

By Dr. Stadelmann.

This research was undertaken to investigate whether large doses of the alkalies, as the author gives them, especially in diabetes, does not in some way unfavorably influence tissue-change. The experiments were made upon his pupils, who were in a state of nitrogenous equilibrium, and alkalies were given in large doses extending over long periods. The substances exhibited were carbonate, bi-carbonate, and citrate of sodium. The salts of vegetable acids were much more readily absorbed than the carbonates, and were excreted partly as carbonates; while the carbonates were at once acted upon by the gastric juice taking up the hydrochloric acid, thus acting injuriously, both on tissue-change and digestion. The nitrogenous constituents of urine, ammonia and uric acid, were diminished after alkalies. As regards the amount of urea excreted, the cases varied, oscillating between excess over normal, and the reverse, but taking the average over a long period the quantity passed was very nearly normal. The amount of nitrogen in the fæces increased with the diminished consistence of the stools, and occasionally reached double the normal. There was always more or less diuretic effect after the alkalies, and increased oxidation of body-fat seemed also to take place. Phosphoric and sulphuric acids in the urine were diminished, a point of some importance, showing that although by giving acids we may withdraw alkalies from the body, yet by giving alkalies we cannot increase the excretion of mineral acids. It was also found, after giving large quantities of citrate of sodium, that more soda (after deduction of the normal amount) was found in the urine than had been administered. The difference between the absorption of citrates and of carbonates seems to show that citrates are converted into carbonates in the blood, and not in the intestine, as Buchheim supposes. Even in doses of 43 grammes (about 1½ oz.), and after a total quantity of about 600 grammes, citrates caused no dyspepsia, nor any difference in the general health. Further researches were undertaken to determine the effect of alkalies on biliary secretion. A large num-

[1] *Therap. Monatshefte*, August, 1890; reprinted from *Med. Chronicle*, October.

ber of salts were used, and in small doses were found to have no influence; in large doses the secretion was diminished. Thus the beneficial effect of such waters as Carlsbad, in liver disease, must not be ascribed to a cholagogue action, but simply to lessened secretion.

MINUTE OF COLLEGE MEETING.

PHILADELPHIA, September 29, 1890.

A stated meeting of members of the College was held this day, Charles Bullock presiding. The minute of the last stated meeting being read, was, on motion, adopted. The minute of the Board of Trustees for June was read and approved. The report of the Delegates from this College to the Meeting of the American Pharmaceutical Association, recently held at Old Point Comfort, Va., was made verbally by Prof. Remington, as follows:

"The meeting was well attended. The number present was probably augmented by the fact that the preceding meeting had been held on the Pacific, and many were debarred from maintaining an annual attendance. The presence of a number of the earlier and older members was a noticeable feature. Our local and individual pride was greatly honored in the selection of Mr. Alfred B. Taylor, of this city, as the presiding officer. Much interest was manifested in the proceedings and in the work of the various sections of the organization. An event of much interest to pharmacists, and a result of a formation of a committee of the pharmaceutical body upon the mutual relations of druggists and physicians, is the fact of the American Medical Association constituting a section on pharmacy, and extending an invitation to the American Pharmaceutical Association to send as representatives to their body at their annual meeting in 1891, at Washington, twenty-five pharmacists to consider and confer upon these relations."

The President announced the death of William C. Henszey, of the firm of Carpenter, Henszey & Co., of this city, and a member of this College. The subject was, on motion, referred to the Committee on Deceased Members, with a view to the preparation of a memoir.

Mr. Bullock read a memoir on the death and personal history of Samuel S. Bunting, formerly Treasurer of this College (see October number of AMER. JOUR. PHARM.).

The terms of A. P. Brown, Daniel S. Jones and H. Trimble, Trustees, expiring with this date, and the demise of S. S. Bunting having created a vacancy in the Board of Trustees, it was, on motion, resolved to proceed to an election to fill these several places. The Tellers appointed by the chair, Messrs. Boring and Krewson, announced the result to be as follows:

Trustees for three years, Albert P. Brown, Daniel S. Jones, Henry Trimble.

Trustees for unexpired term of Samuel S. Bunting, deceased, William N. Stem.

On motion the meeting adjourned.

WILLIAM B. THOMPSON, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 21, 1890.

The meeting was called to order and on motion Mr. William B. Webb was invited to take the Chair. The minutes of the last meeting were read and approved.

Prof. Maisch presented the third part of the Pharmacographia Indica from the authors, Messrs. Dymock, Warden & Hooper, and commented upon its great value for information regarding the medicinal plants of India.

Mr. Joseph W. England stated that he was convinced from observation that nearly all errors made in the putting up of prescriptions were the result of conversation with those around, or some mental pre-occupation; to try and stop part of this trouble he had a card printed, recommending persons while waiting for prescription to commence an unnecessary conversation with the person so engaged; the absurdity of such a request would be the most likely means of stopping it.

Written communications being in order, Mr. Joseph W. England read a paper upon *antiseptic materials*, see page 553. In the discussion which ensued after the reading of the paper, it was asked why the use of alcohol was directed in making the solutions. To this, reply was made that the cloth was so much more readily dried when thus treated than when water only was used.

Dr. C. B. Lowe said that we all were much pleased with the clear distinction made between antisepsis and disinfection, but that in his judgment the preparation of antiseptic materials could not be done in the average apothecary store, that the dispensing-room did not admit of it and that few apothecaries had any other room where such work could be done. In this connection he advised apothecaries not to treat wounds or recent accidents, but refer them at once to a physician, and cited an instance where help was extended by an apothecary to an injured person and the physician who subsequently saw the case advised the patient to sue for a couple of hundred dollars damages for improper treatment!!!

One of the members present stated that the teachings of the best surgeons now was that absolute cleanliness was the greatest point in antisepsis.

Professor Maisch said that some fifteen or more years ago Professor Dragendorff had a very large number of investigations made under his supervision on numerous organic and inorganic compounds relative to their antiseptic and disinfectant value and that solutions of mercuric chloride and iodide were shown to be the most powerful agents for destroying bacteria and for preventing their development. Since then a great number of experiments made by distinguished operators in this department of hygiene amply proved the correctness of his statements; and solutions of these salts were now used so dilute as scarcely to be called poisonous, except when taken in large quantities.

Mr. Beringer asked Mr. England whether he had experimented with Lister's last proposed substance, mercuric cyanide, and with what results; the reply was that he had not, but he learned that it had not proven as satisfactory as Mr. Lister had expected.

A discussion upon the difference that has been observed in the action of ether for anæsthetic purposes of the different manufacturers led to the state-

ment that some manufacturers were very careful to make for that purpose an ether of low specific gravity containing little or no alcohol.

Professor Trimble read a paper upon *American galls*, which showed that some of these contained notable quantities of tannin.

Professor Maisch said he was gratified to hear this paper, and expressed his opinion that the white oak galls would never become of commercial value; but that the galls from *Quercus virens* or live oak of our Southern States were rich in tannin, and might be of commercial value if obtainable at a reasonable price and in sufficient quantity. It would also be interesting to have the spongy galls of the *Quercus lobata* of California examined; these are of a yellow color, blushed with red on one side, from an inch to an inch and a half in diameter, and contain a colony of insects. Galls are also found on some species of Solidago and other plants. The whole subject is very interesting, and deserving of further and closer investigation.

A paper upon the *growth of the Camphor tree in Florida* was read by Professor Maisch, who also exhibited a little of the crude camphor made by Messrs. A. J. Beach & Co., and sent to Mr. Heinitsh.

Professor Maisch exhibited specimens of the metals *Aluminium* and *Magnesium* made on a large scale by Mr. Wm. Frischmuth, Frankford Avenue, in this city; their remarkable lightness attracted attention, as well as the brightness of the former, and the thinness to which it has been rolled out.

Mr. Beringer had received specimen of a plant from a Virginia physician, which proved to be *Scrophularia nodosa*, variety *marilandica;* some of the roots had numerous tubercles.

Professor Trimble presented a sample of *Cassie* from Georgia, the odor of which is so agreeable that it is largely used as a perfume; but it has the singular property of imparting a strong alliaceous odor to the breath of those who eat it which, while unperceptible to the user, renders his company intolerable to all near him.

There being no further business on motion adjourned.

T. S. WIEGAND, *Registrar.*

EDITORIALS.

The Metric System.—A decree recently issued by the Russian Government directs all students of medicine and pharmacy to thoroughly acquaint themselves with the metric system of weights and measures, it being the intention of requiring, in the course of five years, the writing and compounding of prescriptions according to that system.

The State Pharmaceutical Examining Board of Pennsylvania held an examination in the Central High School, at Philadelphia, on Monday, October 6, and in the College of Pharmacy, at Pittsburgh, on Tuesday, October 7, 1890. One hundred and seventeen candidates applied for Registered Pharmacists' certificates, and eighty for Qualified Assistants' certificates. Forty-eight of the former, and forty-nine of the latter class were successful.